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1920 N Street, NW
Suite 510
Washington, DC 20036
(202) 887-0605

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INSIDE SPACE

SPECIAL ISSUE

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INTRODUCTION

This issue is dedicated to a discussion of the FCC's Equipment Authorization Program. Many of the questions presented deserve thorough industry consideration and discussion. It is suggested that it would be beneficial for the dialogue to start now and also for this matter to be placed on the agenda for the October 13, 1981, meeting of the Board of Directors. To assist you in your deliberations of these matters, we have included with this issue of **INSIDE SPACE**, copies of the Rules which we reference in the discussion.

SPACE PIONEERS

AVCOM OF VIRGINIA, INC.
R. Andrew Hatfield
Richmond, VA 23236
(804) 794-2500

BIRDVIEW SATELLITE COMM., INC.
Charles A. (Bud) Ross
Chanute, KS 66720
(316) 431-0400

CHANNEL MASTER (Div. of Avnet, Inc.)
Richard Deutsch
Oxford, NC
(914) 647-5000

DISCOM SATELLITE SYSTEMS, INC.
David L. Pool
Independence, MO
(816) 836-2828

DEXCEL, INCORPORATED
Bruce Lemoine
Santa Clara, CA 95050
(408) 727-9833

EARTH STATIONS, INC.
Robert Maul, Ed Tomaszewski II
Grosse Pointe, MI 48230
(313) 882-2079

EARTH TERMINALS, INC.
Clyde Washburn
Fairport, NY 14450
(716) 223-7457

HERO COMMUNICATIONS
Robert Behar
Hialeah, Florida 33012
(305) 887-3203

INTERNATIONAL CRYSTAL MFG.,
INC.
Royden Freeland, Jr.
Oklahoma City, OK 73102
(405) 236-3741

KLM ELECTRONICS
Peter J. Dalton
Morgan Hill, CA 95037
(408) 779-7363

MICROWAVE ASSOCIATES
Tom Humphries
Houston, TX 77038
(713) 995-7070

NATIONAL MICROTTECH
Horton Townes
Grenada, MS 38901
(601) 226-8432

SAT SHARE, INC.
Nelson Thibodeaux
Houston, TX 77040
(713) 460-9900

SAT-TEC SYSTEMS
John G. Ramsey
Panfield, NY 14526
(716) 586-3950

SATELINC
Eugene D. Lewis
Chesertown, NY
(518) 494-4151

SATELLITE TECHNOLOGY SVCS.,
INC.
James Rothbarth
St. Louis, MO 63141
(314) 569-3720



FCC EQUIPMENT AUTHORIZATION

In general, the FCC requires that before certain devices which radiate electrical energy may be marketed, such devices must be authorized by the Commission. This approval may come in one of several forms depending upon the type of device and which section of the Commission's Rules applies. Three basic authorizations are provided. These are:

Type acceptance. - Type acceptance is an equipment authorization issued by the Commission for equipment to be used pursuant to a station authorization (license). Type acceptance is based on representations and test data submitted by the applicant. Most often the type acceptance procedure is used to authorize transmitters.

Certification. - Certification is an equipment authorization issued by the Commission for equipment designed to be operated without individual license under Parts 15 and 18 of its Rules, based on representations and test data submitted by the applicant. Part 18 concerns industrial, scientific and medical equipment and is not directly applicable to the industry. Part 15, however, concerns various forms of "Radio Frequency Devices" as described more fully below.

Type approval. - Type approval is an equipment authorization issued by the Commission based on examination and measurement of one or more sample units by the Commission at its laboratory. Under this procedure, the FCC is actually examining the applicant's device. Type approval may be thought of as an authorization that would normally fall under either the "type acceptance" or "certification" category, but, where the FCC wants to take a closer look.

PART 15

Part 15 of the FCC Rules, entitled "Radio Frequency Devices", contains several sections which have relevance to the TVRO industry. Subpart A contains some general provisions and two important definitions. These are:

Restricted Radiation Device. A device in which the generation of radio frequency is intentionally incorporated into the design, and in which the radio frequency energy is conducted along wires or is radiated, exclusive of transmitters which require licensing under other parts of this Chapter and exclusive of devices in which the radio frequency is used to produce physical, chemical or biological effects in materials and which are regulated under the provisions of Part 18 of this Chapter.



THE HISTORY OF THE

The history of the world is a vast and complex subject, encompassing the lives of countless individuals and the events that have shaped our planet. From the earliest civilizations to the modern era, the story of humanity is one of constant change and evolution. This book aims to provide a comprehensive overview of this history, from the dawn of time to the present day.

The first part of the book explores the origins of life and the development of early human societies. It discusses the role of geography and climate in shaping human evolution and the emergence of agriculture and civilization. The second part of the book focuses on the ancient world, covering the rise and fall of major empires such as the Egyptians, Greeks, and Romans.

The third part of the book examines the Middle Ages, a period of significant cultural and religious change. It discusses the rise of Christianity and the influence of the Church on European society, as well as the Crusades and the fall of the Byzantine Empire. The fourth part of the book covers the Renaissance and the Enlightenment, periods of intellectual and artistic flourishing that led to the development of modern science and philosophy.

The fifth part of the book discusses the Industrial Revolution and the rise of modern nations. It explores the impact of technological innovation on society and the environment, as well as the challenges of war and social inequality. The final part of the book looks at the 20th century and the future of humanity, discussing the impact of nuclear war, globalization, and environmental change.

CHAPTER I

The first chapter of the book discusses the origins of life and the development of early human societies. It explores the role of geography and climate in shaping human evolution and the emergence of agriculture and civilization. The chapter also discusses the early human migrations and the development of language and culture.

The second chapter of the book focuses on the ancient world, covering the rise and fall of major empires such as the Egyptians, Greeks, and Romans. It discusses the political, social, and cultural developments of these civilizations and the impact of their achievements on the modern world. The chapter also explores the role of religion and philosophy in ancient societies.

Class I TV Device. A restricted radiation device that produces, on frequencies allocated for television broadcasting, a radio frequency carrier modulated by a video signal and which feeds the modulated radio frequency energy to the associated television receiver by conduction.

Class I TV Device

Three features distinguish the Class I TV Device from other Restricted Radiation Devices. The Class I TV Device generates a modulated RF signal carrying video, with or without audio information, and is similar to the signal transmitted by a television broadcast station. In the Class I TV Device, this signal is transmitted over a wire or cable. It is not transmitted by radiation through space. Finally, the signal is fed directly to a conventional television receiver.

To come within the category of a Class I TV Device, the equipment must meet all of the above criteria -- type of signal generated, the method of transmission, and connection to a conventional TV receiver. For example, certain video recorders, television cameras, TV game devices, and certain modulators, intended for use with video devices, are deemed to be Class I TV Devices. On the other hand, equipment used with a cable television system or equipment producing signals on other than television broadcasting frequencies, are not deemed to be Class I TV Devices. For example, a television camera in a closed-circuit TV system which provides video (and aural) information at video base band frequencies or frequencies other than those allocated for television broadcasting may not be a Class I TV Device. TVRO receivers which incorporate modulators within their design may, however, be deemed Class I TV Devices.

Subpart H, titled "Class I TV Devices", establishes a limit on the amount of radiation which a Class I TV Device may emit. Section 15.419 provides as follows:

Radiation interference limits. The field strength of any electromagnetic energy radiated from the cabinet, control circuits and power leads of a Class I TV Device (having its output terminated by a resistance equal to the rated output impedance) shall not exceed the field strength of 15 microvolts per meter at a distance of $\lambda/2\pi$, or at a distance of one meter, whichever is the larger distance.

Radio Receivers

Subpart C entitled, "Radio Receivers", contains Rule 15.63 which establishes various radiation interference levels applicable to radio receivers operational in the range of 30-890 MHz. This Rule provides as follows:

Radiation interference limits - (a) The radiation from all receivers that operate (tune) in the range 30-890 MHz, including frequency modulation, broadcast receivers and television broadcast receivers, manufactured after the effective date in Section 15.72 shall not exceed the following field strength limits at a distance of 100 feet or more from the receiver:

<u>Frequency of Radiation (MHz)</u>	<u>Field Strength (u V/m)</u>
0.45 up to and including 25	See Paragraph (b). (This is contained in Section 15.63(b))
over 25 up to and including 70	32
over 70 up to and including 130	50
130 - 174	50 - 150 (linear interpolation)
174 - 260	150
260 - 470	150 - 500 (linear interpolation)
470 - 1,000	500 (A different criteria and means of compliance is established for television broadcast receivers operating between 470 - 1,000 MHz. These are contained in Section 15.63(c))

PROBLEMS WITH THE EXISTING CLASS I TV DEVICE RULES

Several years ago, the emanation limits set forth in Section 15.419 of the FCC Rules, were objected to in petitions filed by RCA and Texas Instruments. It was argued that the increasing complexity of circuitry which provides the video input signal to the RF modulator has created situations in which compliance with this section of the FCC Rules is not practical in commercial production. Texas Instruments argued that the logic circuits in microprocessors employed in sophisticated electronic equipment generate radio frequency emissions in excess of the standard. It stated that compliance with this requirement was particularly difficult in the case of the manufacturing of a personal computer. It pointed out that some manufacturers were marketing computers with a video monitor. By doing so, those manufacturers arguably avoided becoming subject to the Class I TV Device Rules, radiation limits, and requirements for type approval. At the same time, such a monitor imposed an additional cost on the consumer of anywhere from

\$200 to \$400. Other manufacturers were encouraging the purchase of an RF modulator to be used as an interface device between the computer and home TV receiver. These stand-alone modulators were not authorized by FCC Rules and Texas Instruments requested that the Rules be amended to authorize them.

RCA's video disk player and videotape players and recorders manufactured for use in the home contained an RF modulator that produced, on frequencies allocated for television broadcasting, a radio frequency carrier modulated by conduction, and were accordingly classified as Class I TV Devices. RCA argued that the video disk players and the videotape recorders were actually "systems" containing more than one restricted radiation device operating simultaneously. RCA pointed out that the electronic circuits employed in these "systems", which process and transfer the video signal to the input of the RF modulator are separately distinguishable Restricted Radiation Devices which are covered by other Sections of Part 15. In short, RCA argued that the Commission's regulation of one portion of a system, under rules intended and established for another portion of the same system, was not a practical approach. RCA proposed rules which were identical to the existing Class I TV Device Rules except that a lesser radiated emission standard was proposed and a certification requirement was substituted for type approval.


THE PROPOSED RULES

Responding to the petitions, the FCC proposed to replace the present Class I TV Device Rules with regulations that would provide for the operation of all devices that feed RF signals into a TV receiver, including a TV stand-alone RF modulator. The proposed rules recognize two major components of a video display system, in addition to the TV receiver. These are the "Video Source" which is defined as follows:

a device which generates a video signal intended primarily to supply a video input signal to a TV interface device. Video sources may include, but are not limited to, home computers, television cameras employed in closed-circuit applications, videotape recorders, video disk players and electronic video games.

The other is "TV Interface Device", which is defined as:

a device that produces a radio frequency carrier modulated by a video signal from a video source and which feeds the modulated radio frequency energy to the antenna terminals of a conventional television receiver by conduction.



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Also, in place of its existing radiation standard governing Class I TV Devices contained in Section 15.419, the FCC proposed a less onerous standard to be applicable to TV Interface Devices. This proposed standard, which is contained in proposed Section 15.606, is as follows:

The field strength of any electromagnetic energy radiated from the cabinet, control circuitry and power leads of a TV interface device (having its output terminated by a resistance equal to the rated output impedance) shall not exceed the following limits:

<u>Frequency (MHz)</u>	<u>Field Strength (u V/m at 3 meters)</u>
30-88	100
88-216	150
216-1000	200

Other provisions are contained in the proposed rules governing line conducted interference limits, design, and certification requirements. The proposed rules are enclosed.

APPLICATION OF THE EXISTING RULES GOVERNING CLASS I TV DEVICES AND PROPOSED RULES GOVERNING TV INTERFACE DEVICES TO THE TVRO BUSINESS

The application of the various FCC Rules and Procedures to each TVRO unit is different depending upon the configuration of such unit.

I. Where a receiver and modulator are contained in the same housing, the unit would fall under the existing definition of a Class I TV Device or the proposed definition of a TV Interface Device. Under the FCC staff's existing processing procedures, if an individual unit fits the definition of a Class I TV Device or a TV Interface Device, Commission authority to market such a device may be sought under either the FCC's existing Rules (Section 15.419), or its proposed rules (Section 15.606).

II. If the modulator is, in fact, separate from the receiver, the modulator may be a TV Interface Device with the receiver being considered as the Video Source. As previously noted, existing FCC requirements do not appear to provide for authorization of stand-alone modulators. Therefore, their continued use may be unauthorized. On the other hand, such units appear to be TV Interface Devices under the proposed rules, and therefore, may be certified pursuant to the Commission's proposed rules.

III. With respect to the receiver itself, there are no specific rules governing microwave receivers operating in the 4 GHz band. However, under many existing TVRO configurations, where microwave frequencies are downconverted to between 30 - 890 MHz and fed into a receiver, the device may very well be governed by the radiation limitations contained in Section 15.63 and subject to certification. That is because such receivers may be deemed by the Commission to "operate" or "tune" in the range of 30-890 MHz under the provisions of Section 15.63. While an argument may be made that such devices really "operate" at microwave frequencies and that the downconversion frequencies are merely "intermediate frequencies" in an overall system, it is not at all clear that the FCC will take that position.

THE HEATH AND THE MICRODYNE UNITS

Heath Applications and Grant

The FCC has looked at two units, one belonging to the Heath Company, and the other to Microdyne. In the Heath unit, a downconversion to intermediate frequencies occurs prior to the entry of the signal into the receiver. Heath applied for, and was granted, both type approval as a Class I TV Device (Section 15.419) and certification of its radio receiver (Section 15.63). As discussed in the previous paragraph, whether Heath's approach has industry-wide impact depends upon how the Commission will view the applicability of Section 15.63.

FCC Language In The Heath Grant

The language in the authorization to Heath contains language concerning the applicability of Section 605. This language is a far cry from what had originally been proposed by some members of the FCC staff. The original language would have been extremely restrictive and onerous to the TVRO industry. The resulting language reflects the result of extensive dialogue between SPACE's Counsel and the FCC staff:

Please be advised that this authorization should not be understood to condone actions that promote or encourage violations of Section 605 of the Communications Act of 1934, as amended. Moreover, the authorization is granted on the condition that advertisements for the above referenced device are not designed to encourage violation of Section 605. Such advertising may result in revocation of this grant. Use of the following language would be presumed to demonstrate compliance with the above condition:

"Use of this device may violate Section 605 of the Communications Act of 1934, as amended, through the unauthorized interception and divulgence of radio communications; or, the use of radio communications for one's own benefit where there is no entitlement to its receipt."

The FCC has suggested inclusion of the sentences in quotations above in advertising. The inclusion of these sentences, however, is not mandatory; they may be included at the discretion of the TVRO manufacturer. If the suggested language is used, it is presumed that the manufacturer has complied with the provisions of the grant of equipment authorization. We believe that use of this language could be a significant safeguard against a suit by the program suppliers against manufacturers of equipment. Indeed, it may also be useful in isolating distributors from liability under Section 605.

Microdyne Unit

In the Microdyne unit, we understand that virtually all the electronics were contained in one package and the output of the package fed to the TV set. Microdyne applied for certification of its unit under the proposed rules as a TV Interface Device. It did so by filing for a waiver of the existing Class I TV Device standards.

QUESTIONS PRESENTED

Based upon the above discussion, we request industry views on the following questions:

1. Does a TVRO receiver which accepts a signal downconverted into intermediate frequencies (between 30 - 890 MHz) "operate" or "tune" the range of 30 to 890 MHz so as to come within the radiation limitations of Section 15.63?
2. If so, is there any reason to have such a receiver certificated because of interference potentials? Alternatively, should we seek a rulemaking exempting such receivers from FCC requirements?
3. How difficult is it to meet the radiation requirements imposed by Section 15.63? Will compliance with these requirements pose industry-wide problems?

4. Do most existing stand-alone modulators comply with the radiation limitations contained in the proposed rules governing TV Interface Devices? Are there difficulties in obtaining certification of these units?
5. Are there other interference issues -- such as the 4 GHz interference which may be caused when two or more TVRO's are located in close proximity -- that should be addressed?
6. At the October 13, 1981, Board meeting in which these matters will be discussed, do we want representatives of the FCC's Laurel Laboratory to participate on an informal basis?

RECOMMENDATIONS

These matters go far beyond mere academic interest. Section 302 of the Communications Act of 1934 empowers the Commission to regulate devices which have the capability of emitting radio frequency energy by radiation conduction or other means. FCC Rules do not allow the marketing of Restricted Radiation Devices without prior Commission authorization. Marketing is defined under the Commission's Rules as including "the sale or lease, offer for sale or lease, advertising for sale or lease, the import or shipment or other distribution for the purpose of sale or lease, or offer for sale or lease."

We strongly recommend that industry consideration of the FCC rules governing equipment authorizations be one of the first matters addressed by the SPACE Board of Directors at its upcoming meeting which is to be held October 13, 1981, in Washington. We would welcome additional nominations for a Technical Committee from the Pioneers and Board. Royden Freeland of International Crystal Manufacturing, Inc., and Lou Dorren of Microelectronics Technology Corporation, have already volunteered to serve on a technical committee to address these issues.

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RADIO FREQUENCY DEVICES

* * * *

NOTE: Part 15, Subparts A, B and C promulgated by order in Docket No. 9288, effective February 1, 1956, 20 FR 10056. For Report see 13 RR 1543. Subpart D added by order in Docket No. 9288, effective August 20, 1956, 21 FR 5366. For Report see 13 RR 1546a. Subpart E added by order in Docket No. 9288, effective August 19, 1957, 22 FR 5855. For Report see 13 RR 1546e. Title of Part 15 changed by order in Docket No. 14769, effective December 28, 1962, 27 FR 11698; formerly "Incidental and Restricted Radiation Devices."

Part 15 extensively revised by editorial amendments, effective April 1, 1975, 40 FR 10673. Date of June 1, 1975, changed to October 1, 1975, in ¶ 65:131, 65:135, 65:136, 65:143, 65:163, 65:193 and 65:347 by order effective June 3, 1975, 40 FR 24524.

Subpart A - General

[¶65:1] §15.1 Scope of this Part. - (a) An incidental and restricted radiation device may be operated under the restrictions and provisions set forth in this part without an individual license. The operation of an incidental or restricted radiation device not in accordance with the provisions herein is prohibited by Section 301 of the Communications Act of 1934, as amended.

NOTE: The provisions of an authorized radio service may permit the use of an incidental or restricted radiation device but only in accordance with an individual license and the restrictions set forth in the rules of such authorized radio service.

(b) The requirements, technical specifications, and equipment authorization procedures for an incidental and restricted radiation device, which apply to the marketing of such a device, are set forth herein. The manufacture and marketing of such a device without prior Commission authorization is prohibited by Section 302 of the Communications Act of 1934, as amended.

[¶65:2] §15.2 Special Temporary Authority. - (a) A petition for rule making requesting an amendment to permit the operation of an incidental or restricted radiation device in a manner inconsistent with this part and not in accordance with the provisions of some other part of this chapter may be accompanied by an application for Special Temporary Authorization to operate the device on a developmental basis where it can be shown that

such temporary operation would aid in final determination as to whether the proposed rule should be adopted, and that such temporary operation would otherwise be in the public interest.

(b) The Commission will, in exceptional situations, consider an individual application for a special temporary authorization to operate an incidental or restricted radiation device not conforming to the provisions of this part, where it can be shown that the proposed operation would be in the public interest, that it is for a unique type of station or for a type of operation which is incapable of establishment as a regular service, and that the proposed operation cannot feasibly be conducted under this part.

[¶65:3] §15.3 General condition of operation. - Persons operating restricted or incidental radiation devices shall not be deemed to have any vested or recognizable right to the continued use of any given frequency, by virtue of prior registration or certification of equipment. Operation of these devices is subject to the conditions that no harmful interference is caused and that interference must be accepted that may be caused by other incidental or restricted radiation devices, industrial, scientific or medical equipment, or from any authorized radio service.

[¶65:4] §15.4 General definitions. - (a) Radio frequency energy. Electromagnetic energy at any frequency in the radio spectrum between 10 kHz and 3,000,000 MHz.

(b) Harmful interference. Any emission, radiation or induction which endangers the functioning of a radionavigation service or of other safety services or seriously degrades, obstructs or repeatedly interrupts a radiocommunication service operating in accordance with this chapter.

(c) Incidental radiation device. A device that radiates radio frequency energy during the course of its operation although the device is not intentionally designed to generate radio frequency energy.

(d) Restricted radiation device. A device in which the generation of radio frequency is intentionally incorporated into the design and in which the radio frequency energy is conducted along wires or is radiated, exclusive of transmitters which require licensing under other parts of this chapter and exclusive of devices in which the radio frequency energy is used to produce physical, chemical or biological effects in materials and which are regulated under the provisions of Part 18 of this chapter [¶68].

(e) Marketing. As used in this part, marketing shall include sale or lease, offer for sale or lease, advertising for sale or lease, the import or or shipment or other distribution for the purpose of sale or lease or offer for sale or lease.

NOTE: In the foregoing sale (or lease) shall mean sale (or lease) to the user or a vendor who in turn sells (or leases) to the user. Sale shall not be construed to apply to devices sold to a second party for manufacture or fabrication into a device which is subsequently sold (or leased) to the user.



(f) Low power communication device. A low power communication device is a restricted radiation device, exclusive of those employing conducted or guided radio frequency techniques, used for the transmission of signs, signals (including control signals), writing, images and sounds or intelligence of any nature by radiation of electromagnetic energy.

(g) Television broadcast receiver. Apparatus designed to receive television pictures broadcast simultaneously with sound.

(h) Noise figure of a television broadcast receiver. The ratio of (1) the total noise power delivered by the receiver into its output termination when the noise temperature of its input termination is standard (290°K) at all frequencies, to (2) the portion thereof engendered by the input termination.

NOTE: For a television broadcast receiver, portion (2) includes only that noise from the input termination which appears in the output via the principal frequency transformation and does not include spurious contributions such as those from image-frequency transformation.

(i) Peak picture sensitivity for television broadcast receiver. The lowest input signal which results in standard picture test output when the receiver is tuned for maximum picture output.

NOTE: Standard picture test output for symmetrical sinewave modulation shall be 20 volts peak-to-peak between the control elements of the picture tube.

(j) Field disturbance sensor. A restricted radiation device which establishes a radio frequency field in its vicinity and detects changes in that field resulting from movement of persons or objects within the radio frequency field.

(k) Biomedical telemetry device. A low power communications device consisting of one or more transmitters which is used to transmit, within a restricted area, via a radio frequency field, measurements of either human or animal biomedical phenomena to a receiver.

(l) Auditory training device. A transmitter or receiver used for auricular instruction of persons having speech or hearing handicaps.

(m) Class I TV devices. A restricted radiation device that produces, on frequencies allocated for television broadcasting, a radio frequency carrier modulated by a video signal and which feeds the modulated radio frequency energy to the associated television receiver by conduction.

(n) Computing Device. Any electronic device or system that generates and uses timing signals or pulses at a rate in excess of 10,000 pulses (cycles) per second and uses digital techniques; inclusive of telephone equipment that utilizes digital techniques or any device or system that generates and utilizes radio frequency energy for the purpose of performing data processing functions, such as electronic computations, operations transformations, recording, filing, sorting, storage, retrieval, or transfer. Radio

transmitters, receivers, industrial, scientific and medical equipment and any other radio frequency device which are specifically subject to an emanation requirement elsewhere in this Chapter are excluded from this definition.

NOTE: Computer terminals and peripherals (i. e., Input/Output devices for computers) which are intended to be connected to a computer are considered computing devices. All other components or subassemblies (e. g., switching power supplies) of a computing device are not included in this definition.

(o) Class A computing device. A computing device that is marketed for use in a commercial, industrial or business environment; exclusive of a device which is marketed for use by the general public, or which is intended to be used in the home.

(p) Class B computing device. A computing device that is marketed for use in a residential environment notwithstanding use in commercial, business and industrial environment. Examples of such devices include, but are not limited to, electronic games, personal computers, calculators, and similar electronic devices that are marketed for use by the general public.

NOTE: A manufacturer may also qualify a device intended to be marketed in a commercial, business or industrial environment as a Class B computing device, and in fact is encouraged to do so, provided the device complies with the technical specifications for a Class B computing device. In the event that a particular type of device has been found to repeatedly cause harmful interference to radio communications, the Commission may classify such a computing device as a Class B computing device, regardless of its intended use.

(q) Personal computer. An electronic computer that is marketed for use in the home, notwithstanding business applications. Such computers are considered Class B computing devices. Computers which use a standard TV receiver as a display device or meet all of the following conditions are considered examples of personal computers:

- marketed through a retail outlet or direct mail order catalog
- notices of sale or advertisements are distributed or directed to general public or hobbyist users rather than restricted to commercial users
- operations on a battery or 120 volt electrical supply.

If the manufacturer can demonstrate that because of price or performance the computer is not suitable for residential or hobbyist use, he may request that the computer be considered to fall outside the scope of this definition for personal computers.



(r) Peripheral device. A self-contained input/output unit of a system that feeds data into a computer and/or receives data from a computer, including, for example, terminals, printers, floppy disc devices, other data storage devices, video monitors, keyboards, and other input/output devices that may or may not contain digital circuitry.

(s) Personal computer peripheral equipment. Peripheral equipment capable of connecting to personal computers via cable, and that is marketed for use in residential environments notwithstanding business applications. Such equipment is considered a Class B computing device. Peripherals marketed in the following ways shall be considered personal computer peripheral equipment:

- marketing through a retail outlet or direct mail order catalog.
- notices of sale or advertisements are distributed or directed to the general public or hobbyist users rather than restricted to commercial users.

If a manufacturer can demonstrate that because of price or performance a peripheral is not suitable for residential or hobbyist use, he may request that the peripheral be considered to fall outside the scope of this definition. In other words, he may seek a waiver of the rules classifying a peripheral as a Class B computing device.

¶ NOTE: Subsection (b) amended by order effective November 2, 1961, 26 FR 10281.

Subsection (e) added by order in Docket No. 9288, effective August 20, 1956, 21 FR 5366. For Report see 13 RR 1546a.

Subsection (e) deleted by order in Docket No. 18397 et al., effective March 31, 1972, 37 FR 3252. For Report see 24 RR 2d 1501.

Subsection (e) added, effective April 1, 1975, 40 FR 10673.

Subsection (f) added by order in Docket No. 9288, effective August 19, 1957, 22 FR 5895. For Report see 13 RR 1546e.

Subsections (g), (h) and (i) added by order in Docket No. 14769, effective December 28, 1962, 27 FR 11698. For Report see 24 RR 1585.

Subsection (j) added by order in Docket No. 13863, effective October 5, 1971, 36 FR 16907. For Report see 22 RR 2d 1837.



¶ NOTE: Subsection (k) added by order in Docket No. 19231, effective April 30, 1972, 37 FR 5497. For Report see 23 RR 2d 1736.

Subsection (l) added by order in Docket No. 19185, effective August 22, 1972, 37 FR 13984. For Report see 25 RR 2d 1563.

Subsection (m) added by order in Docket No. 19281, effective January 19, 1973, 37 FR 26601. For Report see 26 RR 2d

Subsections (n), (o) and (p) added by order in Docket No. 20780, effective November 19, 1979, 44 FR 59530. For Report see 46 RR 2d 473.

Subsection (n), (o) and (p) amended and (q) and (r) added by order in Docket No. 20780, effective May 12, 1980, 45 FR 24154. For Order see 47 RR 2d 256.

Subsection (r) removed and new (r) added by order in Docket No. 80-284, effective April 20, 1981, 46 FR

Subsection (s) added by order in Docket No. 20780, effective March 11, 1981, 46 FR . For Order see 49 RR 2d 255.

[¶65:5] §15.5 Equipment available for inspection. - Any equipment or device subject to the provisions of this part together with any license, certificate, notice of registration or any technical data required to be kept on file by the operator of the device shall be made available for inspection by commission representatives upon reasonable request.

[¶65:6] §15.6 Information required by the Commission. - The owner or operator of any device subject to this part shall promptly furnish to the Commission or its representative such information as may be requested concerning the operation of the device, including a copy of any measurements made for the purpose of certification.

¶ NOTE: Section amended by order in Docket No. 14769, effective December 28, 1962, 27 FR 11698. For Report see 24 RR 1584.



[¶65:7] §15.7 General requirement for restricted radiation devices. - Unless regulated under some other subpart of this part, any apparatus which generates a radio frequency electromagnetic field functionally utilizing a small part of such field in the operation of associated apparatus not physically connected thereto and at a distance not greater than 157,000 Ft. (equivalent to $\frac{\lambda}{2\pi}$) need not be licensed provided: $\frac{\lambda}{2\pi}$ F (kHz)

(a) That such apparatus shall be operated with the minimum power possible to accomplish the desired purpose.

(b) That the best engineering principles shall be utilized in the generation of radio frequency currents so as to guard against interference to established radio services, particularly on the fundamental and harmonic frequencies.

(c) That in any event the total electromagnetic field produced at any point a distance of 157,000 Ft. (equivalent to $\frac{\lambda}{2\pi}$) from the $\frac{\lambda}{2\pi}$ F (kHz) apparatus shall not exceed 15 microvolts per meter.

(d) That the apparatus shall conform to such engineering standards as may from time to time be promulgated by the Commission.

(e) That in the event harmful interference is caused, the operator of the apparatus shall promptly take steps to eliminate the harmful interference.

NOTE: Radio receivers, cable television systems, Class I TV devices and low power communications devices are regulated elsewhere in this Chapter and are not regulated by this section.

¶ NOTE: Note to section added by order in Docket No. 14376, effective July 1, 1963, 28 FR 5387. For Report see 25 RR 1717.

Note to section amended by order in Docket No. 19281, effective January 19, 1973, 37 FR 26601. For Report see 26 RR 2d 140.

[¶65:11] §15.11 Prohibition against eavesdropping. - (a) No person shall use, either directly or indirectly, a device operated pursuant to the provisions of this part for the purpose of overhearing or recording the private conversations of others unless such use is authorized by all of the parties engaging in the conversation.

(b) Paragraph (a) of this section shall not apply to operations of any law enforcement officers conducted under lawful authority.

¶ NOTE: Section added by order in Docket No. 15262, effective April 8, 1966, 31 FR 3397. For Report see 6 RR 2d 1691.

(c) Expenses involved in shipping the device to the Commission and in its return shall be borne by the applicant for, or grantee of, the equipment authorization.

[¶65:38] §15.38 Description of measurement facilities. - (a) Each person making measurements to be filed with an application for certification of a device subject to regulations under this part shall file a description of his measurement facilities with the Commission.

(b) The description shall include the following information:

(1) Location of the test site.

(2) Physical description of the test site accompanied by photographs 8" by 10" in size. Smaller photographs may be submitted if they clearly show the required details and are mounted on full size sheets of paper.

(3) Drawing showing the dimensions of the site, the physical layout of supporting structures and all structures within 5 times the distance between the measuring set and the device being measured.

(4) Description of supporting structures used to support the device being measured and the test instrumentation.

(5) List of measuring equipment used.

(6) Information concerning the calibration of the measuring equipment, i. e., when the equipment was last calibrated and frequency of calibration.

(7) A statement indicating whether this facility is available to do measurement work for others on a contract basis.

(c) This information shall be kept current at all times. At least every three years, the organization filing the data shall advise that the data on file is current.

(d) For certification of a decoder device used for detecting the EBS Attention Signal as defined in §73.906 of this Section will not apply.

¶ NOTE: Subsection (d) added by order effective August 20, 1975. 40 FR 34116.

[¶65:39] §15.39 [Reserved]

[¶65:40] §15.40 [Reserved]

[¶65:41] §15.41 Identification of an authorized device. - (a) Each device authorized under a Grant of Certification or a Grant of Type Approval issued under this part shall be labelled pursuant to Subpart J of Part 2 of this chapter.



(b) Additional labelling requirements are set out in the rules governing the specific device.

[¶65:42] §15.42 [Reserved]

[¶65:43] §15.43 [Reserved]

[¶65:44] §15.44 Technical report. – Each application for certification shall include a technical report containing the following information:

(a) The full name and mailing address of the manufacturer of the device.

(b) Trade name, if any, under which the device will be marketed.

(c) Model number.

(d) List any additional model numbers and/or trade names under which the device will be marketed.

(e) For a device other than an FM or TV broadcast receiver, attach a copy of the installation and operating instructions furnished to the user. A draft copy of such instructions may be submitted with the application, provided a copy of the actual document to be furnished to the user is submitted as soon as it is available.

(f) For a device used in decoding the Emergency Broadcast System Attention Signal as defined in §73.906, the value of the necessary voltage (RMS) or range of voltages of the attention signal to be applied to the input terminals of the decoder which will cause the desired response of the device shall be submitted to the Commission with the certification data. In the event input signals other than the attention signal (excluding signals which can in combination form the attention signal), including signals at levels outside this voltage range, will cause false responses by the device, a description of such signals and their input voltage levels which cause such false responses shall be specified in the application and appropriate warnings shall be included in the instructions furnished to the user. The susceptibility of the device to false responses and any lack of reliability in responding to the attention signal at input voltage levels within the rated voltage range may be regarded by the Commission as cause to deny certification.

¶ NOTE: Subsection (f) added by order effective August 20, 1975, 40 FR 34116.

[¶65:45] §15.45 Expository statement required. – Each application for certification shall be accompanied by an expository statement as follows:

(a) FM, AM/FM or TV broadcast receiver which does not use standard IFs: If the broadcast receiver does not use an IF of 10.7 MHz for FM reception, or an IF of 41.25/45.75 MHz for TV reception, state the IFs that are used.



(b) Television broadcast receiver: A statement regarding the comparable ease of tuning of UHF with respect to VHF pursuant to §15.68.

(c) Multiband broadcast receiver: For a receiver that includes reception capability in communications bands in addition to the FM, AM/FM or TV broadcast bands, attach a statement indicating the tuning range of each band in the receiver, the tuning range of the oscillator in each band, the IF used for each band, and a block diagram showing the signal path and the frequency at each block.

(d) Receiver other than a broadcast receiver: A statement indicating the tuning range of each band, the tuning range of the oscillator in each band, the IF used for each band, and a block diagram showing the signal path and the frequency at each block.

(e) Device other than receiver: A block diagram showing the signal path and frequency at each block. For all devices other than a device for decoding the EBS Attention Signal as defined in §73.906, the diagram shall also indicate the tuning range of each band in the device, the tuning range of the oscillator in each band, and the frequency of the IF amplifier for each band. The tuning range of a fixed tuned device is the range of frequencies over which it can be tuned without replacement of coils, capacitor or other circuit elements of subassemblies. Attach a statement describing how the device operates. The statement should include a circuit diagram, a description of the circuitry in the device, and a description of the antenna and ground system, if any, used with the device.

NOTE: Subsection (e) amended by order effective August 20, 1975, 40 FR 34116.

[J65:46] §15.46 Photographs required. - (a) For a receiver attach a photograph showing the general appearance of the receiver and the controls available to the user. If this photograph does not show the required identification in sufficient detail so that the name and model number can be read, attach a second photograph giving this detail. If the device is a TV receiver and the channel readout provision is not clear on these photographs, attach an additional photograph clearly showing the channel readout provision.

(b) For a device other than a receiver, attach a sufficient number of photographs to clearly show the exterior appearance, the construction, the component placement on the chassis and the chassis assembly. The exterior views shall show the overall appearance, the antenna used with the device, the controls available to the user, and the required identification label in sufficient detail so that the name and model number can be read.

(c) Photographs should be 8" by 10" in size. Smaller photographs may be submitted provided they are sharp and clear and show the necessary detail and are mounted on paper between 8 x 10-1/2 and 8-1/2 x 11 inches in size. In lieu of a photograph of the label, a sample label (or facsimile thereof) may be submitted together with a sketch showing where this label will be placed on the equipment provided the label and sketch are mounted on a sheet of paper between 8 x 10-1/2 and 8-1/2 x 11 inches in size.

[J65:47] §15.47 [Reserved]



[¶65:48] §15.48 Private label device - Multiple listing of a device. -

(a) When the same or essentially the same device will be marketed under more than one trade name or model number (as in the case of private label equipment), certification or type approval must be requested separately for each such additional trade name or model number.

(b) If certification for additional trade name(s) or model number(s) is requested in the initial application, a statement shall be included describing how these additional devices differ from the basic device that was measured and stating that the report of measurements submitted for the basic device, applies also to the additional devices.

(c) If certification for additional trade name(s) or model number(s) is requested after the basic device has been certificated, the application may, in lieu of the report of measurement, be accompanied by a statement including:

(1) Name and model number of device for which measurements are on file with the Commission.

(2) Date when certification was granted for the device listed under subparagraph (1) of this paragraph and the file number of such grant.

(3) Description of the difference between the device listed under subparagraph (1) of this paragraph and the additional device.

(4) A statement that the report of measurements filed for the device listed under subparagraph (1) of this paragraph applies also to the additional device(s).

(d) The application shall be accompanied by photographs pursuant to §15.46.

[¶65:49] §15.49 Changes in an authorized device. - (a) Changes in a type approved device may be made under §2.967 of Part 2 of this chapter [¶52:967].

(b) Changes in a certificated device may be made under §2.1043 of Part 2 of this chapter [¶52:1043].

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Subpart C - Radio Receivers

NOTE: Section numbers in Subpart C redesignated by recodification order, 28 FR 12521. For cross-reference table see page 65:5, supra.

[§65:59] §15.59 Interference requirement for a CB receiver. - (a) For the purpose of this regulation a CB receiver is defined as any receiver that operates in the Personal Radio Services on frequencies allocated for CB stations, as well as any receiver provided with a separate band specifically designed to receive the transmissions of CB stations in the Personal Radio Services. The term CB receiver includes the following:

- A CB receiver sold as a separate piece of equipment.
- The receiver section of a CB transceiver.
- A converter to be used with any receiver for the purpose of receiving CB transmissions.
- A multiband receiver that includes a band labeled "CB" or "11-meter" in which such band can be separately selected, except that an Amateur Radio receiver that was manufactured prior to January 1, 1960 and which includes an 11-meter band shall not be considered to be a CB receiver.

(b) A CB receiver model which is initially placed in production after January 1, 1977 shall be certificated pursuant to Subpart B of this part and Subpart J of Part 2 of this chapter, to meet all the requirements of this section; provided, however, if the receiver is a part of a CB transceiver for which an application for type acceptance is filed on or after September 10, 1976, an application for certification of the receiver section of such transceiver must be filed simultaneously with the application for type acceptance.

(c) With the antenna terminals of the CB receiver connected to a resistor equal to the manufacturer's rated input impedance, the power at the antenna terminals at any frequency in the range 25-500 MHz shall comply with the following:

- (1) For a CB receiver model initially placed in production after January 1, 1977
..... 2.0 nanowatts.
- (2) For a CB receiver model initially placed in production after January 1, 1978
..... 0.2 nanowatts.

(d) With the antenna terminals of the CB receiver connected to a shielded resistor equal to the manufacturer's rated input impedance, the emission on any frequency in the range 25 to 500 MHz shall not exceed 5 uV/m at a distance of 3 meters from the surface of the receiver initially placed in production after January 1, 1977. Measurements shall be made with microphone and all other options attached.

(e) If the CB receiver is intended to be connected to the power lines of a public utility, the conducted interference fed back into the power lines shall not exceed 100 uV at any frequency in the range 0.45-25 MHz. This requirement shall also apply to a battery operated CB receiver which has the capability of being connected to the power lines through a battery charger or through any type of battery eliminator.

(f) The manufacture of a CB receiver model that has not been certificated to meet all the requirements of this section shall be terminated as soon as possible but in no event later than August 1, 1977.

(g) The marketing of non-certificated CB receivers shall be terminated not later than January 1, 1978.

(h) In lieu of meeting the requirements of paragraphs (c) and (d) of this section, a CB receiver which has a built-in antenna and does not have readily accessible antenna terminals, may meet a field strength limit as follows:

- (1) For a CB receiver model initially placed in production after January 1, 1977
 110 uV/m at 3m.
- (2) For a CB receiver model initially placed in production after January 1, 1978
 40 uV/m at 3m.

¶ NOTE: Section added by order in Docket No. 20746, effective September 10, 1976, 41 FR 32590. For Report see 38 RR 2d 53.

Subsections (a), (b) and (e) amended and (h) added by order in Docket No. 20746, effective December 1, 1976, 41 FR 47441. For Report see 38 RR 2d 1243.

Subsection (a) amended by order in Docket No. 20746, effective June 16, 1978, 43 FR 25122.

[765:61] §15.61 Scope of this Subpart. - Radio receivers come within the scope of this subpart insofar as they are restricted radiation devices and generate and radiate radio frequency energy or are designed to receive television pictures broadcast simultaneously with sound. Typically this subpart limits oscillator radiation from superheterodyne receivers. In the case of television broadcast receivers, this subpart also limits the radiation of radio frequency energy which is generated by the sweep circuits, and requires that such receivers be capable of adequately receiving all television broadcast channels.

¶ NOTE: Section amended by order in Docket No. 14769, effective December 28, 1962, 27 FR 11698. For Report see 24 RR 1585.



[J65:63] §15.63 Radiation interference limits. - (a) The radiation from all radio receivers that operate (tune) in the range 30 to 890 MHz, including frequency modulation broadcast receivers and television broadcast receivers, manufactured after the effective date specified in §15.72 shall not exceed the following field strength limits at a distance of 100 feet or more from the receiver:

<u>Frequency of radiation (MHz)</u>	<u>Field Strength (uV/m)</u>
0.45 up to and including 25	See paragraph (b)
Over 25 up to and including 70	32
Over 70 up to and including 130	50
130 - 174	50 - 150 (linear interpolation)
174 - 260	150
260 - 470	150 - 500 (linear interpolation)
470 - 1000	500 (see paragraph (c) below)

(b) Pending the development of suitable measurement techniques for measuring the actual radiation in the band 0.45 to 25 MHz, the interference capabilities of a receiver in this band will be determined by the measurement of radio frequency voltage between each power line and ground at the power terminals of the receiver. This requirement applies only to radio receivers intended to be connected to power lines of public utility systems. For television broadcast receivers the voltage so measured shall not exceed 100 uv at any frequency between 450 kHz and 25 MHz inclusive. For all other receivers the voltage shall not exceed 100 uv at any frequency between 450 kHz and 9 MHz inclusive, 1000 uv for frequencies between 10 MHz and 25 MHz and linear increase from 100 uv to 1000 uv for frequencies between 9 MHz and 10 MHz.

(c) For television broadcast receivers the limit in the band 470-1000 MHz shall be 350 uV/m, compliance being determined as follows:

(1) Measurements shall be made at the following ten frequencies in the band 470-1000 MHz.

520 MHz	600 MHz	700 MHz	800 MHz	900 MHz
550	650	750	850	931

NOTE: If measurements cannot be made on one or more of the frequencies listed because of the presence of signals from licensed radio stations, measurements should be made on a nearby frequency. The report should indicate the actual frequency(ies) on which measurements were made.

(2) The average of the ten measurements shall not exceed 350 uV/m.

(3) No measurement shall exceed 750 uV/m.



(d) Notwithstanding the provisions of paragraph (a) of this section and subject to the prohibition against emissions on the frequencies listed in §15.215(c), the level of emission of RF energy from the receiver used with a radio control for a door opener shall not exceed the values listed below when measured in accordance with the procedures laid down in FCC Technical Division Report, T-7001, dated October 1, 1970.

<u>Frequency (MHz)</u>	<u>Field Strength at 100 ft. (uV/m)</u>
Over 25 up to and including 70	32
Over 70 up to and including 200	50
200 - 1500	50 - 500 (linear variation)
Over 1500	500

¶ NOTE: Note to section designated as paragraph (b) and amended by order in Docket No. 12018, effective July 1, 1957, 22 FR 4754. Previously amended by order adopted and effective September 27, 1956, 21 FR 7578.

Subsection (c) [and reference thereto in Subsection (a)] added by order effective April 30, 1964, 29 FR 2558.

Subsection (c) amended by order in Docket No. 18689, effective July 31, 1970, 35 FR 2405, 5948.
For Reports see 18 RR 2d 1532, 1711.

Subsection (c) previously amended 29 FR 2558, 32 FR 6933, 10854, 34 FR 7497.

Subsection (d) added by order in Docket No. 15657, effective May 7, 1971, 36 FR 6504. For Report see 21 RR 2d 1633. Effective date changed to November 1, 1971, 36 FR 12905. See 22 RR 2d 1719.



Subpart H - Class I TV Devices

NOTE: Subpart H added by order in Docket No. 19281, effective January 19, 1973, 37 FR 26601. For Report see 26 RR 2d 140. Effective date extended to July 1, 1973, 38 FR 2689.

[¶65:401] §15.401 Conditions of operation. - (a) A Class I TV device shall operate within a channel allocated for television broadcasting providing its operation at all times complies with the requirements of this Subpart.

(b) A Class I TV device shall transmit its output signal to a receiving device by means of a direct connection (either wires or coaxial cable) provided by the manufacturer.

[¶65:402] §15.402 Cross reference. - The provisions of Subparts A and B of this part and Subpart J of Part 2 of this chapter shall apply to a Class I TV device operating under this subpart.

¶ NOTE: Section added, effective April 1, 1975, 40 FR 10673.

[¶65:403] §15.403 Output signal level. - The voltage corresponding to the peak envelope power of the video modulated signal during maximum amplitude peaks across a resistance (R ohms) matching the rated output impedance of the device, shall not exceed $346.4 \sqrt{R}$ microvolts. The peak envelope power of the sound modulated signal shall be at least 13 dB below that of the video modulated signal.

NOTE: If $R=300$ ohms, the maximum RMS output voltage of the video carrier is 6000 microvolts.

If $R=75$ ohms, the maximum RMS output voltage of the video carrier is 3000 microvolts.

[¶65:405] §15.405 Output terminals. - A Class I TV device which provides a desired output on two or more television channels simultaneously shall be provided with separate terminals for each channel output.

[¶65:407] §15.407 Transfer switch and isolation requirement. - Each Class I TV device shall be equipped with a receiver transfer switch for connecting the antenna terminals of the receiver selectively either to the receiving antenna or to the radio frequency output of the Class I TV device. In either of its positions, the receiver transfer switch shall provide at least 60 dB isolation between the Class I TV device and the receiving antenna on any TV channel on which the Class I TV device can be operated.

¶ NOTE: The Commission's Chief Engineer sent the following letter to Electronics Industries Association (FCC 94491, January 4, 1973):

"This is in reply to your letter dated December 20, 1972, requesting an interpretation of the antenna transfer switch and isolation requirements for Class I TV devices.



¶ NOTE: "Our Rules, Section 15.407, requires the receiver transfer switch to provide 60 dB of isolation in either position, i. e., with the TV receiver connected to the antenna or with the receiver connected to the Class I TV device. You point out that equipments are produced in which the power to the Class I TV device is removed when the antenna is connected to the TV receiver thereby preventing the generation of RF interference from this device. You raise the question whether or not such equipment must meet the 60 dB switch requirement in both positions. Please be advised that the 60 dB isolation requirement between the antenna and the Class I TV device will be considered to be met, if the device is constructed so that power is removed from the Class I TV device when the switch connects the TV receiver to the antenna."

[J65:409] §15.409 Output terminal conducted interference limits. - At any RF output terminal, the peak envelope power of any emission appearing on frequencies removed by more than 3 MHz from either edge of the standard TV channel on which the device is operated shall be attenuated below the peak envelope power of the visual signal by no less than 30 decibels, measured with a matched termination.

[J65:411] §15.411 Type approval. - (a) A Class I TV device shall be type approved pursuant to Subpart B of this part.

(b) The application for type approval shall be submitted on Form 731 and shall include the following attachments:

(1) A statement detailing the technical specifications of the device.

(2) Two copies each of a circuit diagram and instruction manual.

(c) To receive type approval, a Class I TV device must meet the following requirements:

(1) The device must comply with the requirements of this subpart.

(2) The design and construction of the equipment must give reasonable assurance of compliance with the requirements of this subpart for at least 5 years under normal operation and with average maintenance.

(3) The device must be so constructed that the adjustment of any control accessible to the user will not cause operation in violation of the requirements of this subpart.

¶ NOTE: Subsection (b) amended, effective May 17, 1976, 41 FR 19947.

[J65:413] §15.413 Certification of built-in tuner. - If a Class I TV device includes a built-in television tuner as part of its design, the device must also be certificated pursuant to Subpart B of this part to show that the television tuner complies with the requirements for a television receiver in Subpart C of this part.

¶ NOTE: Section amended, effective April 1, 1975, 40 FR 10673.



[J65:415] §15.415 Identification of a Class I TV device. - (a) Each Class I TV device for which a type approval application was filed on or after May 1, 1981, shall be identified pursuant to §2.925 and §2.969. The FCC Identifier for such equipment will be validated by the grant of approval issued by the Commission. The nameplate or label of the equipment shall include the following statement:

"This device complies with FCC Rules Part 15. Operation is subject to the following two conditions: (1) This device may not cause harmful interference and (2) this device must accept any interference that may be received, including interference that may cause undesired operation."

(b) Each Class I TV device for which a type approval application is filed before May 1, 1981, will be assigned a type approval number as listed in the grant of type approval. The type approval number and the following statement shall be permanently inscribed upon or permanently attached to the exterior of each production unit as follows:

" FCC Type Approval No. _____
Valid only when operated pursuant to FCC Rules Part 15. "

NOTE: Section amended by order in Docket No. 20790, effective April 25, 1979, 44 FR 17175, 21021, 45 FR . For Report see 45 RR 2d 349.

[J65:417] §15.417 Measurement of field strength. - Field strength of video modulated signals shall be measured with instruments responding to the peak value, and the band width of any instrument used for such measurements above 50 MHz shall be at least 150 kHz. An electrostatically shielded loop antenna lying in a vertical plane shall be used for measurements on frequencies below 18 MHz and a dipole antenna for measurements on frequencies above 30 MHz, in both polarizations. Either a loop or a dipole antenna may be used on frequencies between 18 and 30 MHz.

[J65:419] §15.419 Radiation interference limits. - The field strength of any electromagnetic energy radiated from the cabinet, control circuits and power leads of a Class I TV device (having its output terminated by a resistance equal to the rated output impedance) shall not exceed the field strength of 15 microvolts per meter at a distance of $\lambda / 2\pi$ or at a distance of 1 meter, whichever is the larger distance.

[J65:421] §15.421 Line-conducted interference limits. - The RF voltage measured between each power line and ground at the power terminals of the device shall not exceed 100 microvolts at any frequency between 450 kHz and 25 MHz, inclusive when measured in accordance with IEEE Standard 213.



[J65:423]. §15.423 Interference from a Class I TV device. - (a) Operation of a Class I TV device is subject to the general conditions of operation set forth in §15.3.

(b) The operator of a Class I TV device who is advised by the Commission that his device is causing harmful interference shall promptly stop operating the device and shall not resume its operation until the condition causing the harmful interference has been eliminated.

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FCC 79-556
14687
44 FR 59570



In the Matter of)	
)	
Amendment of Part 15 of the)	Gen. Docket No. 79-244
Commission Rules to provide)	RM 3328
for the operation of a TV)	RM 2876
Interface Device.)	

Adopted, September 18, 1979
Released: October 11, 1979

NOTICE OF PROPOSED RULE MAKING

By the Commission: (Commissioners Lee and Quello absent; Commissioner Brown concurring.)

1. The Commission herewith institutes a proposed rule making proceeding to consider adoption of the rules contained in the Appendix to this Notice. By this docket we proposed to amend Part 15 of our rules and regulations 1/ to revise those rules governing equipments intended to utilize the home television receiver as a video display. 2/ Specifically, this proceeding will deal with the establishment of regulations which will provide for the operation of a TV interface device. 3/

2. This proceeding results from two petitions for Rule Making. One petition filed April 6, 1977 by the RCA Corporation (RM 2876) 4/ and the other filed February 16, 1979 by Texas Instruments, Inc. (RM 3328). 5/ A list of those parties filing comments and reply comments on these petitions are contained in the Appendix A to this Notice.

Regulatory Background

3. In 1972 the Commission amended its rules to establish Subpart H of Part 15 governing Class I TV devices. The Commission's intent was to permit the marketing of equipment intended to utilize the home television receiver for a video display. By definition, a device that feeds a modulated signal to a TV receiver used as a display device is classified as a Class I TV device 6/ in the Commission rules and must meet the applicable regulations (Part 15 Subpart H) 7/ before it may be marketed. The definition of a Class I TV device has been construed not only to include the RF modulator, but also the circuitry intended to provide the video signals for the RF modulator. Thus, the Commission generally has

1/ 47 CFR §15.1-15.423.

2/ The equipments designed to utilize the home television receiver as a video display include, but are not limited to, home computers, video tape recorders, electronic video games, and television cameras employed in closed circuit applications.

3/ A TV interface device (also referred to as a video RF modulator) is a radio frequency device which when connected to the home TV receiver permits it to be used as a display device for any source of video signal. The TV interface device may stand alone or may be built into combination with a video source and/or TV receiver.

4/ The RCA Corporation petition was put on public notice April 18, 1977 (Report 1039).

5/ The Texas Instruments, Inc. petition was put on public notice March 2, 1979 (Report 1166).

6/ A Class I TV device is defined in §15.4(m) as follows:

"(m) Class I TV device. A restricted radiation device that produces on frequencies allocated for television broadcasting, an RF carrier modulated by a video signal and which feeds the modulated RF energy to the associated television receiver by conduction."

7/ 47 CFR §15.401-15.423.

applied the radiation interference limits set forth in §15.419 8/ not only to the radio frequency modulator but also to all circuits of the Class I TV device including the circuits which are the source of the video signal.

The Texas Instruments, Inc. (TI) Contention

4. In its petition for rule making, TI contends that the emanation limits set forth in §15.419 can be met by RF modulators of good design, but the increasing complexity of circuitry which provides the video input signal to the RF modulator has created situations in which compliance with §15.419 for the video sources is not practical in commercial production. Typically, logic circuits and microprocessors employed in sophisticated electronic equipment generate radio frequency emissions in excess of the standard set forth in §15.419. For simple machines, such as video electronic games, this requirement initially posed some difficulty. But, for the more sophisticated machines, such as today's personal computers, 9/ the problem becomes more intense. The switching times employed in the home computer are often so fast that radiation in excess of that set forth in §15.419 is emitted.

5. TI contends that §15.419 imposes requirements which are inconsistent with the economics required to market a personal computer in volume, thereby, denying the equipment to the mass market consumer. Conventional techniques for minimizing radio frequency interference, such as shielding, do not provide an effective solution for this class of equipment. In addition to careful shielding, special treatment is required for all lines that transverse the shield.

6. TI argues that the present rules in Part 15 were not written with the personal computer in mind and thus, they unduly limit the availability of this technology to the detriment of public interest. Because of the time and energy savings which these computers can produce, this technology should be offered to the widest cross section of the American public possible.

7. TI contends that if compliance with §15.419 for the personal computer were essential to prevent significant interference to radio services, then it would be appropriate to maintain the present technical standards for both the computer and the RF modulator. However, TI points out that a significant amount of data has been collected which demonstrates that a somewhat less stringent emission standard could be applied to the computer without significantly increasing its interference potential.

8. TI points out that some manufacturers are marketing computers with a video monitor. 10/ In this way, they avoid becoming subject to the Class I TV rules with its strict limits of radiation and requirements for type approval by the Commission as a prerequisite for marketing. 11/ Using a video monitor alleviates the need to use the home TV receiver as a display device. TI maintains that this burdens the purchaser with an unnecessary cost of about \$200-400 and argues that this approach is not in the best interests of the consumer.

8/ Section 15.419 provides that "the field strength of any electromagnetic energy radiated from the cabinet, control circuits and power leads of a Class I TV device (having its output terminated by a resistance equal to the rated output impedance) shall not exceed the field strength of 15 microvolts per meter at a distance of $\lambda/2\pi$ or at a distance of 1 meter, whichever is the larger distance."

9/ The term "personal computer" refers to a computer that is relatively low cost, mass produced for sale to the general public, and is intended for use in the home.

10/ A video monitor is a device that accepts a video signal and displays that signal on a cathode ray tube. It differs from a TV receiver in that an RF carrier (TV channel) is not used, an RF tuning mechanism is not required and no local oscillator or IF strip is included in the monitor.

11/ 47 CFR §§15.401-15.423.



9. Other manufacturers who market computers, according to TI, instruct the purchaser to procure an RF modulator and use this modulator as an interface device between the computer and the purchaser's home TV receiver. This approach, TI argues, induces the user to buy and use a device in violation of the Commission's rules.

10. Thus when a manufacturer provides a video monitor as a display device, the purchaser is burdened with an extra cost of at least \$200. If the manufacturer sells the computer without a video monitor display, he is in essence encouraging violation of the FCC rules by encouraging the vendor to sell non-approved devices in violation of the Commission's marketing regulations. At the same time, the purchaser is encouraged to violate the FCC rules by using a non-approved device. Either course of action according to TI is contrary to the public interest. In contrast, TI has asked the Commission to revise its regulations and to permit the legal sale and use of a stand alone modulator. ^{12/} The stand alone modulator could provide the consumer with greater flexibility in the use of his television receiver in order to utilize products which TI and, undoubtedly, other companies would offer.

Details of the Texas Instruments, Inc. Proposal

11. The TI petition calls for the establishment of a new equipment category known as the "Class II TV device." This device differs from the Class I device in that the video source is not contained within the device. Class II TV devices principally would be stand alone RF modulators. At a minimum, the devices would be required to meet the same output level restrictions set forth in present §15.403 for Class I TV devices, and the same extraneous radiation limitations set forth in present §15.419 for such equipment. In addition, Class II TV devices would be required to incorporate circuitry to prevent automatically the operation of the device in such a way as to exceed the limitations set forth in present §15.403, §15.409, §15.419, and §15.421 of the Commission's rules. ^{13/} TI also proposes that the Class II TV device rules contain provisions which would permit marketing of a Class II TV device in an unassembled kit. Finally, the petition calls for the certification of equipment intended primarily to serve as the video source for Class II TV devices. In the case of personal computers, this would mean that a computer, primarily designed to supply a video input signal to a Class II TV device, would be required, according to TI's proposal, to be certificated as being in compliance with the following TI suggested limits prior to marketing:

(1) The field strength of many electromagnetic energy radiated from the cabinet, control circuits and power leads of the video source used with a Class II TV device shall not exceed the following:

Frequency of Radiation	Measurement Distance (meters)	Radiation (in $\mu\text{V/m}$)
10 kHz - 2400 kHz	30	24000/f (kHz)
2.4 MHz - 30 MHz	3	100
30 MHz - 88 MHz	3	200
88 MHz - 216 MHz	3	300
216 MHz - 1000 MHz	3	300-1000 linearly inter- polated

^{12/} A stand alone modulator (also referred to as a separate RF modulator) is an interface device that permits a home TV receiver to be used as a display device for any source of video signal.

^{13/} These rules prescribe the limits for output signal level, out of band conducted emissions, radiated emissions, and line conducted emissions for a Class I TV device which TI proposes be applied to its Class II TV device.



(2) All emissions from a video source intended to be connected to the power lines of a public utility system shall not exceed the following:

<u>Frequency Range (MHz)</u>	<u>Signal Level (μV)</u>
0.1 - 0.45	2000
0.45 - 25	1000

RCA Corporation Petition

12. The RCA petition requests amendment of Part 15 of the Commission's rules to provide for a new category of restricted radiation devices that encompasses video disc players and video tape players and recorders. Since the video disc player and video tape players and recorders manufactured for use in the home contain an RF modulator that produces, on frequencies allocated for television broadcasting, a radio frequency carrier modulated by conduction, they are currently classified as Class I TV devices. Therefore, the video disc player, video tape player, and video tape recorder are subject to the technical limits and requirements for type approval of Part 15, Subpart H.

13. RCA submits that video disc players and video tape recorders are actually "systems" containing more than one restricted radiation device operating simultaneously and that the electronic circuits employed in these "systems" to obtain, process and transfer the video signal to the input of the RF modulator are in actuality separately distinguishable restricted radiation devices which are covered by other sections of Part 15. 14/

14. RCA believes that to regulate one portion of a system under rules intended and established for another portion of the same system is neither the intent of the current Part 15 rules, nor a practical approach in the design, production, and operation of such systems.

15. RCA has developed a new product in the home entertainment field, named the "Selecta-Vision VideoDisc," that plays prerecorded video programs through an ordinary TV receiver. The VideoDisc system utilizes a combination of restricted radiation devices which are currently regulated under various sections of Part 15. The devices are contained within the VideoDisc cabinet and are required for the proper functioning of the system. The individual devices include: a pick-up device (a field disturbance sensor under Subpart F, Part 15) 15/ that reads pre-recorded information embedded on the surface of a rotating disc; a video sub-carrier generator (a restricted radiation device under §15.7) that is used in the processing of the video information as it is transferred from the pick-up to the input of the RF modulator; and, an RF modulator (a Class I TV device under Subpart H, Part 15) that generates the RF carrier signals which are fed by direct connection to the antenna circuit of a TV receiver.

16. RCA believes that to make distinctions as to performance and RF emissions limitations, among various portions of a system which operate simultaneously unduly complicates the Commission's equipment approval process. Therefore, RCA feels that a rule making proceeding, looking toward producing the necessary regulations, is needed to provide for the operation of a self-contained video disc player or a video tape player and recorder, incorporating a combination of restricted radiation devices operating simultaneously.

17. The RCA petition proposes a new category of restricted radiation devices which would be called "Class II TV devices" and would encompass video disc players and video tape players/recorders now included under Class I TV device category. The Class II TV device classification as proposed by RCA would be an extension of the Class I TV device concept. The rules applying to a Class II TV device would be the same as those currently in Subpart H, Part 15 governing Class I TV devices with the exception of the radiated emission

14/ 47 CFR §15.7 and §§15.301-15.323.

15/ 47 CFR §§15.301-15.323.



limitations and requirements for type approval. A Class II TV device, as proposed by RCA, would be required to be certificated prior to marketing and the level of radiated emissions from the device would be required to meet the current emission limitations established for each of the individual restricted radiation devices incorporated therein, with the greater level of permissible emission at a particular frequency, where more than one limit would apply, becoming the governing emission limitation for the Class II TV device at that frequency.

Comments received in response to the Texas Instruments petition

18. Analysis of the comments filed in response to Texas Instruments petition shows that nearly all were supportive of the idea of the Commission establishing a proceeding in which a comprehensive review of Part 15 rules as they apply to personal computers and other restricted radiation devices which are designed to be interconnected to the television receiver would be undertaken. However, Dash-Straus opposed the petition on the basis of what they call a very serious threat of interference from personal computers. They contend that several personal computers have already been approved under the current Class I TV devices rules which they believe are adequate. Therefore, they feel there should be no change in those rules.

19. Telecasters and Interact both oppose the adoption of the rules suggested by TI in its petition because they believe that the permitted levels of radiated emissions suggested by TI are too high for the home environment. In contrast, however, CBEMA was supportive of TI's approach to setting limits for personal computers. But CBEMA was unable to comment on the specific values proposed by TI for limits of radiated emissions without further studies being conducted in that area.

20. RCA was the only commenter who was fully supportive of the TI petition without some reservations about the rules proposed therein. Their main concern was that the Commission initiate a rule making proceeding at the earliest possible date taking into consideration both the similarities and differences of the TI petition and the RCA petition for rule making (RM 2876).

21. The only commenting party specifically addressing TI's proposal for a stand alone RF modulator was Atari. Atari states that TI in its petition claims that there is a recognizable and ever increasing need for RF modulators to be made separately available to the public. But, the logic regarding why that is so, however, is never developed by TI. Atari points out that TI's major argument is that such devices are available on the black market and to avoid having the public unwittingly violate the Commission's regulations, manufacturers should be able to lawfully market stand alone RF modulators. Atari submits that there is no persuasive justification for allowing RF modulators to be sold and regulated independently of their associated video sources, and that such a separation policy would not alleviate the interference problem plaguing personal computer technology. Atari contends that, in fact, the Commission must acknowledge that independently marketed RF modulators will function as a conduit for a potential multitude of harmfully interfering video sources aggravating the interference problem.

22. In another area, Atari claims that the potential for interference isn't limited to personal computers of the type proposed for marketing by TI which are to be interconnected to the home TV receiver. Atari contends that there is also a problem with those personal computers employing separate video monitors. Therefore, Atari submits that the Commission would be ill-advised to limit the rule making proceeding only to selected areas with which the TI proposal is concerned. Accordingly, Atari submits that it would be appropriate for the Commission to evaluate the interference potential of the entire personal computer model within the framework of a rule making which TI requests the Commission to institute. Atari believes that with the personal computer meeting the requirements of §15.7 and the modulator meeting the limits of §15.419 the public's reception of radio and television signals would be sufficiently protected. However, although Atari believes the existing emission limits are reasonable, it supports the adoption of a Notice of Proposed Rule Making so that (1) the interference potential of personal computers can generally be explored, and (2) new rules may be promulgated to insure equivalent regulations of personal computers - both those that stand alone and those which are connected to a television receiver.

23. Atari questions TI's rationale for proposing the establishment of separate classes of television devices and subjecting them to different emission limits. If the existing RF interference specifications for Class I TV devices (§15.419) are reasonable for the RF modulator as proposed by TI in its proposal, Atari believes that the video source, i.e., the personal computer should not be governed by less stringent emission limits. In addition, Atari submits that TI's proposed certification for the video source and type approval for the RF modulator would be an ineffective manner in which to have adequate control over the interference problem. Atari perceives no logic in posing a less stringent authorization procedure on the equipment having the greatest interference potential.

24. Addressing specifically, certain sections of the current rules for Class I TV devices, 16/ Atari submits that they should be reviewed and updated to eliminate inconsistencies which cause measurement difficulty and penalize some manufacturers. Atari submits that the 60 dB switch isolation requirement in §15.407 17/ penalizes manufacturers whose equipment produces less than the maximum output signal allowable by §15.405. 18/ Citing an example, Atari states that if a Class I TV device has an output level of 3000 microvolts, the allowable signal level on the receiving antenna terminals of the transfer switch would be required to be 60 dB down or 3 microvolts. A different Class I TV device may have an output of 1,000 microvolts, with an acceptable signal 60 dB down being 1 microvolt. Thus, if the latter Class I TV device produced 2 microvolts instead of the presently permissible 1 microvolt, it would fail to satisfy the requirement of §15.407 and yet would actually put less RF interference on the television antenna than the described Class I TV device with an output level of 3,000 microvolts. Atari believes that this problem could be corrected by imposing a specific maximum level at the receiving antenna terminals of the switch regardless of the output level of the device. Atari contends further that §15.409, because of the same inconsistency, should be revised to specify a maximum level for out-of-band signals rather than the existing power ratio.

25. In its reply comments TI addressed the question of different Commission standards for the RF modulator and video sources as proposed in its petition. TI believes that unlike the video source, the RF modulator should be subject to more stringent standards because the device will be directly connected to the television receiver and, unlike personal computers, could be connected to the television receiving antenna which would become the transmitting antenna if the modulator were improperly designed. They state also that the modulator is designed to generate the frequency signal on the assigned video carrier of the television channel. Consequently, it raises a greater potential for co-channel or adjacent channel interference particularly in multiple unit dwellings where UHF signals may be routed over a distribution system after having been first converted to VHF signals. In short, there are differences between RF modulators and video sources which would warrant that the RF modulator be subject to the most stringent standards reasonably possible.

Comments received in response to the RCA Corporation petition

26. All of the parties commenting on the RCA petition were supportive and agreed that there is a need for new rules which recognize the unique requirements of a video disc player or any other equipment which incorporates a combination of restricted radiation devices contained within the same cabinet and operating simultaneously. In addition, all parties agreed with RCA's proposal for certification rather than type approval which

16/ The rules section addressed by Atari, 47 CFR §15.407 and §15.409, are retained by TI in its proposal for a Class II TV device.

17/ Section 15.407 requires that a Class I TV device be equipped with a transfer switch which provides for connecting the antenna terminals of the TV receiver selectively either to the receiving antenna or to the RF output of the Class I TV device. It also requires the switch provide at least 60 dB isolation between the Class I TV device and the receiving antenna.

18/ The maximum RF output signal permitted from a Class I TV device is 6000 microvolts if the output impedance of the device is 300 ohms or 3000 microvolts if the output impedance of the device is 75 ohms.



would permit production changes without the delays inherent in resubmitting equipment for Commission testing and approval.

Discussion

27. We find that both TI and RCA have demonstrated a sufficient public interest for their respective devices (TV stand alone RF modulator and video disc player) to merit issuance of a Notice of Proposed Rule Making at this time. In our analysis of these two petitions it was clearly evident that similarity in the two proposals dictated combining them in a single proceeding.

28. Although both TI and RCA petitions requested creation of a second classification of TV devices in our rules, the petitions differ in the type of equipment that would be subject to the rules promulgated under these classifications. We do not agree that a second Classification of TV devices is the best approach to providing for the regulation, marketing, and operation of the types of equipment envisioned by these two petitioners. Over the past several years, the Commission has made a concerted effort to minimize the number of rules required to adequately regulate those areas under its jurisdiction. Two classifications and their associated rules would lead to confusion and complications which we feel is not in the best interest of either the manufacturer or the consumer. Therefore, we are proposing in this proceeding to replace the current Class I TV device rules with a single set of regulations which provides for the operation of all devices that feed RF signals into a TV receiver including a TV stand alone RF modulator. We are calling such a device a TV interface device. ^{19/} We believe that the TV interface device rules proposed herein are not only comprehensive enough to provide for the operation of the current Class I TV devices but also the equipments which are the subject of the TI and RCA petitions.

29. Both TI and RCA have requested that we recognize that our rules must provide enough flexibility to allow the operation of equipments which cannot always comply with a single set of rules and regulations. Under the current Class I TV rules there exists one set of requirements and limitations which had to be met by various devices although their design functions and needs for RF energy differed completely from one another. We agree with the petitioners and in the rules proposed in this proceeding we have endeavored to provide for maximum flexibility of equipment design for the manufacturer and operation for the consumer. However, this flexibility has been balanced by our intent to protect existing users of the radio spectrum.

30. In this proceeding, we recognize that most of the equipment produced today that uses the home TV receiver as a video display device, are actually systems composed of two or more restricted radiation devices which operate simultaneously to produce a video display from a variety of video originations, recording or playback techniques. Therefore, we are proposing rules which recognize the video display system and its three major components: the video source, ^{20/} the TV interface device, the TV receiver. Not only does this approach provide for the greatest flexibility of design by recognizing the individual needs of each of the restricted radiation devices that compose the system, but it also reduces the requirement for additional rules by relying on existing rules to provide the needed regulatory safeguards. The TV receiver is currently regulated under Subpart C of Part 15 and the video source is regulated by other sections of Part 15 dealing with the specific type of device involved. Therefore, we need only to establish a single set of new rules

^{19/} We are defining a TV interface device as a device that produces a radio frequency carrier modulated by a video signal from a video source and which feeds the modulated radio frequency energy to the antenna terminals of a conventional television receiver by conduction. See §15.4(o) of the appended proposed rules.

^{20/} We are defining a video source as a device which generates a video signal intended primarily to supply a video input signal to a TV interface device. Video sources may include, but are not limited to home computers, television cameras employed in closed circuit applications, video tape recorders, video disc players, and electronic video games. See §15.4(n) of the appended proposed rules.



dealing with the TV interface device with provisions for it to be marketed when constructed in combination with an associated video source or TV receiver.

31. However, we do not wish to ignore the contention raised by TI and commenting parties alike that data processing equipment is a video source not adequately covered by the existing Part 15 rules. TI has accordingly proposed technical requirements and certification for equipment intended primarily to serve as the video source for its proposed Class II TV device. The intent of this part of its proposal is to establish rules under which a computer can be connected to a TV receiver used as a video display. This item elicited more comments than any other proposal in the TI petition. Virtually all of the parties who have commented in this proceeding voiced reservations regarding the technical specifications for the video source proposed by TI.

32. Nevertheless, we believe the question of rules and regulations pertaining to the personal computer as a video source is best addressed in a proceeding which has been seeking answers to the very issues raised by petitioner and commenters to this proceeding. Docket 20780 ^{21/} was opened on April 14, 1976 and one of the items it addressed was the establishment of limits for the emanations from data processing equipment. In light of the large amount of data and comments filed in that proceeding, we do not find it necessary to initiate a new rule making addressing the same issues. Accordingly, we are treating the personal computer aspects of RM-3288 and the comments from Atari and others relating thereto in a separate action in a Report and Order in Docket 20780.

33. Although our proposed rules for a TV interface device are modelled after the current Class I TV rules, several differences should be noted. We have proposed a design requirement, as TI suggested in its petition, to insure that the possibility of harmful interference is minimized if the device is misused by the consumer. Since in some cases the TV interface device will no longer have an associated video source, ample insurance must be built into the TV interface device to ensure that its emanations do not exceed the established limits under a variety of input signal levels. We are also providing for the marketing of a TV interface device in an unassembled kit.

34. We are also proposing higher limits for radiated emissions from the TV interface device than those established for Class I TV devices. Our experience with Class I TV devices over the years has shown that the original limits for these devices were overly restrictive and that higher limits would not prove harmful to television reception. Moreover, since the personal computer and the TV interface device share the same spatial relationship with the TV receiver, it would be appropriate for them to have the same limits. ^{22/}

35. We agree with Atari that the current rules, specifically §15.504 and §15.507, pertaining to Class I TV devices do penalize those manufacturers whose devices produce less than the maximum allowed RF output. The rules appended to this document correct these inconsistencies and reduce the measurement difficulty by providing for a maximum level rather than a ratio.

36. In a letter to the Commission, Zenith Radio Corporation detailed plans to build an FR modulator into a TV receiver to provide a video input jack for the TV receiver which would permit display of various types of video signals generated in other devices. We have associated this letter with this proceeding because it demonstrates another video display device which was not provided for under the current Class I TV rules. We agree with Zenith that this is a logical use of a TV interface device to provide a much needed video input jack on the TV receiver. Therefore, we have made provisions for marketing

^{21/} Docket 20780: In the Matter of Amendment of Part 15 to redefine and clarify restricted radiation devices and low power communication devices. Notice of Proposed Rule Making adopted April 14, 1976, released April 23, 1976, 41 FR 17938 (1976).

^{22/} The derivation and rationale for these proposed limits are presented in the Report & Order in Docket 20780 mentioned above.



a TV interface device which is built into a TV receiver. However, we do not believe that using the TV interface device in lieu of providing a direct access to the TV receiver video circuitry is the best approach for furnishing a video input jack on a TV receiver. Our reservations regarding this approach is based on the fact that with the use of the TV interface device there is a requirement for the generation of an RF carrier with its potential of causing harmful interference. Nevertheless, we are willing to let Zenith and others test their idea in the marketplace. But we would strongly encourage all manufacturers who plan to provide a video input jack on their TV receiver to consider designing the receiver to provide direct access to the video circuitry.

37. Over the past seven years since the promulgation of the Class I TV rules, we have developed confidence in manufacturers' ability to produce equipment which can meet our technical requirements for this type of device and also their ability to accurately measure the equipment to determine if they comply with our rules. Therefore, as one more step in our effort to reduce regulatory burdens we are proposing certification in lieu of type approval. We feel that this will reduce the burden on manufacturers in such areas as design changes with its ensuing production delays because of the necessity of resubmission of equipment to the Commission. At the same time, we feel confident that certification will provide adequate regulatory protection that will insure that these devices do not become a source of harmful interference. In other words, we disagree with those commenters who contend that only through type approval can we ensure that these devices will not become a source of harmful interference. Finally, we are proposing a new Subpart I of Part 15 23/ containing a measurement procedure to be used in making measurements for certification of equipment governed by the rules proposed herein.

Procedural Matters

38. Notice is given of proposed rule making in this matter. Any interested person may participate in this proceeding by filing comments by November 19, 1979. Reply comments may be filed by December 4, 1979. Comments and reply comments may be addressed to the issues and proposals set forth in this Notice and to other issues as the participants believe are relevant and necessary to the resolution of these matters. In reaching its decision, the Commission may take into consideration information and ideas not contained in the comments, provided that such information or writing indicating the nature and source of such information is placed in the public file and provided that the fact of the Commission's reliance on such information is noted in the Report and Order.

39. For further information concerning this Notice contact Mr. Robert Bromery, FCC, Office of Science and Technology, Washington, D.C. 20554, telephone 202-632-7095. However, members of the public should note that from the time a Notice of Proposed Rule Making is issued until the matter is no longer subject to Commission consideration or court review, ex parte contacts made to members of the Federal Communications Commission in this proceeding must be disclosed in the public docket file. A summary of the Commission's procedure governing ex parte contacts in rule making 24/ proceedings is available from the Commission's Consumer Assistance Office, FCC, Washington, D.C. 20554, (202) 632-2700.

40. Authority for the proposed amendments is contained in Sections 3, 4(i) and 301-303 of the Communications Act of 1934, as amended. Pursuant to §1.415 of the Commission's rules, an original and five (5) copies of all comments, reply comments, and other pleadings and submissions shall be furnished to the Commission. All documents will be available for public inspection during regular business hours in the Commission's Public Reference Room at its headquarters in Washington, D.C.

23/ Subpart I of Part 15 was also proposed in General Docket 79-190 which was a Notice of Proposed Rule Making adopted to consider the amendment of Part 15 to provide for the operation of a wireless inflight entertainment system. The proposed Subpart I contained the applicable measurement procedures for certification of Wireless Inflight Entertainment Systems.

24/ See 63 FCC 2d 804 (1978) where the Commission set forth its interim policy.



APPENDIX A

The following parties filed comments in response to the petition filed by Texas Instruments, Inc. (RM-3328).

<u>Name/Organization</u>	<u>Acronym</u>
1. James E. Henderson	
2. Dash-Straus Associates	Dash-Straus
3. Interact Electronics, Inc.	Interact
4. RCA Corporation	RCA
5. Computer and Business Equipment Manufacturers Association	CBEMA
6. Atari, Inc.	Atari
7. Association of Maximum Service Telecasters, Inc.	Telecasters
8. Zenith Radio Corporation */	Zenith

The following parties filed comments in response to the petition filed by RCA Corporation (RM-2876).

1. The Consumer Electronics Group of the Electronics Industries Association
2. Zenith Radio Corporation
3. Magnavox Consumer Electronics Company

APPENDIX B

The following items are proposed amendments to Part 15 of Chapter I of Title 47 of the Code of Federal Regulations.

1. Section 15.7 is amended by changing the appended note to read as follows:

§15.7 General requirements for restricted radiation devices.

NOTE: Radio receivers, cable television systems, TV interface devices, and low power communication devices are regulated elsewhere in this chapter and are not regulated by this section.

2. Section 15.4 paragraphs (q), (r), and (s) are added to read as follows:

§15.4 General definitions

(q) Video source. A device which generates a video signal intended primarily to supply a video input signal to a TV interface device. Video sources may include, but are not limited to computers, television cameras employed in closed circuit applications, video tape recorders, video disc players, and electronic video games.

* / Although not filed in response to the reference petition, the Zenith Radio Corp. letter has been associated with this proceeding because it addresses a related subject.



(r) TV Interface Device. A device that produces a radio frequency carrier modulated by a video signal from a video source and which feeds the modulated radio frequency energy to the antenna terminals of a conventional television receiver by conduction.

NOTE: The TV interface device may be built into a video source, a television receiver, or it may stand alone as a separate piece of equipment. TV Interface devices do not include equipment used within a cable television system nor equipment producing signals at video base band frequencies.

(s) TV Interface Device Kit. Any number of electronic parts, usually provided with a schematic diagram of printed circuit board, which, when assembled in accordance with instructions, results in a TV interface device, even if additional parts of any type are required to complete assembly.

3. The present title, text, and table of contents of Subpart H is deleted in its entirety and is replaced with a new title, text, and table of contents to read as follows:

Subpart H - TV Interface Device

- 15.601 Cross reference
- 15.602 Conditions of operation
- 15.603 Output signal level
- 15.604 Transfer switch
- 15.605 Output terminal conducted interference limits
- 15.606 Radiation interference limits
- 15.607 Line conducted interference limit
- 15.608 General design requirement
- 15.609 Certification Required
- 15.610 Certification with video source
- 15.611 Certification of television receiver and TV interface device combination
- 15.612 TV interface device kit
- 15.613 Labelling requirement
- 15.614 Interference from a TV interface device

§15.601 Cross-reference

The provisions of Subparts A, B, and I of this part and Subparts I, J and K of Part 2 of this chapter shall apply to a TV interface device operating under this subpart.

§15.602 Conditions of operation

(a) TV interface devices shall operate in conjunction with a standard broadcast television receiver and the operation of such devices shall at all times comply with the requirements of this subpart.

(b) The output signals of a TV interface device shall be transmitted to the TV receiver by means of a direct connection (either wires or coaxial cable) provided by the manufacturer of the TV interface device.

§15.603 Output signal level

The voltage corresponding to the peak envelope power of the video modulation signal during maximum amplitude peaks across a resistance (R ohms) matching the rated output impedance of the device, shall not exceed $346.4 \sqrt{R}$ microvolts. The peak envelope power of the sound modulated signal shall be at least 13 dB below that of the video modulated signal.

NOTE: If $R = 300$ ohms, the maximum RMS output voltage of the video carrier is 6,000 microvolts. If $R = 75$ ohms, the maximum RMS output voltage of the video carrier is 3,000 microvolts.

§15.604 Transfer switch

A TV interface device shall be equipped with a receiver transfer switch for connecting the antenna terminals of the TV receiver selectively either to the receiving antenna or to the radio frequency output of the TV interface device. In either position of the receiver transfer switch, the maximum voltage at the receiving antenna input terminals when terminated with a resistance (R ohms) matching the rated impedance of the antenna input of the switch, shall not exceed $0.346 \sqrt{R}$ microvolts. The maximum voltage shall correspond to peak envelope power of the video modulated signal during maximum amplitude peaks.

§15.605 Output terminal conducted interference limits

At any RF output terminal, the maximum voltage of any emission appearing on frequencies removed by more than 4.25 MHz below our 7.75 MHz above the video carrier frequency on which the TV interface device is operated shall not exceed $10.95 \sqrt{R}$ microvolts when terminated with a resistance (R ohms) matching the rated output impedance of the TV interface device.

§15.606 Radiation interference limits

The field strength of any electromagnetic energy radiated from the cabinet, control circuitry and power leads of a TV interface device (having its output terminated by a resistance equal to the rated output impedance) shall not exceed the following limits:

<u>Frequency (MHz)</u>	<u>Field Strength (μ V/m at 3 meters)</u>
30-88	100
88-216	150
216-1000	200

NOTE: The tighter limit shall apply at the edge between two frequency bands.

§15.607 Line conducted interference limits

The RF voltage measured between each power line and ground at the power terminals of the TV interface device shall not exceed 250 microvolts at any frequency between 450 kHz and 30 MHz, inclusive, when measured in accordance with the procedure for measuring conducted voltages for such equipment in Subpart I of this part.

§15.608 General design requirements

(a) A TV interface device shall incorporate circuitry to prevent automatically the devices emanations from exceeding the limits established in §15.603, §15.605, §15.606, and §15.607. These circuits shall be adequate enough to accomplish their function when the TV interface device is presented with video input signal levels in the range of one to ten volts. This requirement is not applicable to a TV interface device which incorporates a built-in video source and has no provisions for the connection of an external video source.

(b) The TV interface device must be so constructed that adjustments of any control accessible to the user will not cause operation in violation of the requirements of this Subpart.

§15.609 Certification required

(a) A TV interface device shall be certificated pursuant to Subpart J of Part 2 of this chapter.

(b) To determine compliance with the technical requirements of this subpart all measurements shall be made in accordance with the applicable procedures set forth in Subpart I of this part.



§15.610 Certification with video source

A television interface device which is constructed in combination with an associated video source (i.e., both devices located in the same cabinet) shall be certified pursuant to Subpart J, Part 2 of this chapter under the following conditions:

(a) The individual restricted radiation devices incorporated therein shall meet the technical and operational requirements established for the individual restricted radiation devices.

(b) All measurements required to be reported under regulations governing the individual restricted radiation devices incorporated therein shall be reported for the frequency ranges, measurement conditions, and modes of operation that apply, respectively.

(c) A single application for certification shall be submitted. Required measurements should be made with all devices operating simultaneously and under the test conditions specified for the individual restricted radiation device incorporated therein.

(d) The radiated emissions from the combined devices shall conform to the emission limitations established for the individual restricted radiation devices incorporated therein, with the greater level of permissible emission at a particular frequency, where more than one limit would apply, becoming the governing emission limitation for the devices at that frequency. This provision is not applicable to television tuners.

§15.611 Certification of a TV receiver and TV interface device combination

If a TV interface device is built into a television receiver, the request for certification of the TV interface device shall be included in the application for certification of the TV receiver. Measurements of the TV interface must be included to show compliance with the technical specifications in this Subpart except for §15.603 and §15.605.

§15.612 TV interface device kit

Any supplier of a TV interface device kit as defined by §15.4(s) of this chapter shall comply with the following requirements:

(a) Assembly of one unit of a specific type shall be made in accordance with the instructions being supplied with the product being marketed. If all of the necessary components are not normally furnished with the kits, assembly shall be made using the recommended components.

(b) The measurement data required for certification shall be obtained for this unit and submitted with a certification application.

(c) A copy of the exact instructions which will be provided for assembly of the device shall be provided in addition to other material required by §2.1033 of this chapter.

§15.613 Labelling requirements

A TV interface device shall be identified pursuant to the requirements in §2.925 et seq. of this chapter.

§15.614 Interference from a TV Interface Device

(a) Operation of a TV Interface device is subject to the general conditions of operation set forth in §15.3.

(b) The operator of a TV Interface device who is advised by the Commission that his device is causing harmful interference shall promptly stop operating the device and shall not resume its operation until the condition causing the harmful interference has been corrected.

4. A new Section I of Part 15 and index are added to read as follows:



Subpart I - Measurement Procedures

§15.701 Scope of this subpart

§15.702 Cross-reference

TV Interface Device

§15.740 Application of procedure

§15.741 General test conditions

§15.742 Measurement of output signal level

§15.744 Measurement of output terminal conducted spurious emissions

§15.745 Measurement of transfer switch characteristics

§15.747 Measurement of field strength: test configuration

§15.748 Measurement of field strength: test equipment

§15.749 Measurement of field strength: procedure

§15.750 Line conducted measurements

§15.751 Report of Measurements

§15.701 Scope of this subpart

This subpart sets forth procedures for measuring emanations from equipment governed by this part of the Commission's rules, where a measurement procedure is not specified for that equipment in other subparts.

§15.702 Cross-reference

The provisions of Subpart B of this part and Subpart J of Part 2 shall apply to the measurement procedures described in this Subpart.

TV Interface Device

§15.740 Application of procedure

This procedure is to be used in testing TV interface Devices as defined in §15.4(r). A TV interface device requires certification by the Commission, pursuant to §15.609.

§15.741 General test conditions

(a) All tests shall be performed with a video source connected. If the TV interface device is constructed in combination with an associated video source (i.e., both devices located in the same cabinet), that source shall be used for the tests. If the TV interface device does not have a built-in source of video signal, or has a provision for an external video source, it shall use the VIT multiburst TV test signal described in §73.699 (a drawing of this signal is presented in Figure 13 of Page 73), applied continuously throughout the active picture field. If the TV interface device can operate from either internal or external sources, tests shall be run with the internal video source and then the external VIT source.

(b) Tests shall be run with the level of the VIT signal at 1 volt and then at 10 volts.

(c) All unused RF terminals shall be terminated in their proper impedance during all measurements.

(d) If the TV interface device is capable of operating on more than one TV channel, then measurements of the output signal level, transfer switch characteristics, and output terminal conducted interference, shall be made for each channel.

§15.742 Measurement of output signal level

(a) The measuring instrument shall be capable of measuring the level of the video modulated signal during maximum amplitude peaks. (Calibration will be in terms of the RMS value of an equivalent sinusoid.) The VSWR at the measuring instrument when connected to the device shall be less than 1.5. The bandwidth of the measuring instrument shall be at least 100 kHz.



(b) If the RF output is to be fed to the TV receiver via coaxial cable, the signal level shall be measured by direct connection to the measuring instrument.

(c) If the RF output is fed to the TV receiver via "twin lead", the output shall be connected to a balanced RF voltmeter or to a balun, which in turn is connected to the measuring instrument. Connecting cables shall be kept as short as possible.

(d) The RF output signal level is construed to mean the highest RF level present at the output terminals during normal use of the TV interface devices. Measurements shall be made of the levels of both the aural and visual carriers.

§15.744 Measurement of output terminal conducted spurious emissions

(a) The measuring instrument shall have the characteristics described in §15.742(a).

(b) If the RF output terminal is intended to be fed to the TV receiver via coaxial cable, measurements can be made by direct connection to the test instrument. If the output is fed via "twinlead", measurements are to be made through an appropriate balun with connecting cable kept as short as practical.

(c) The frequency range 30 MHz to 1000 MHz shall be investigated to locate significant emissions.

§15.745 Measurement of transfer switch characteristics

(a) The measuring instrument shall have the characteristics described in §15.742(a).

(b) Measurements shall be made of the maximum voltage at the antenna input terminals for all positions of the receiver transfer switch.

(c) If the antenna input terminal is to be connected to the antenna via coaxial cable, the signal level shall be measured by direct connection to the measuring instrument.

(d) The following procedure shall apply to the measurement of the signal level at the antenna input of the transfer switch if designed to use "twin lead."

(1) The TV interface device shall be supported so that the non-coaxial terminals are at a height between 75 and 150 centimeters above the ground.

(2) A section of balanced transmission line of the intended type, $\frac{3}{4}$ of a wavelength long at the signal frequency, shall be connected to the antenna input terminals of the switch and supported in a straight horizontal line from the TV interface device to the measuring equipment. There shall be a lateral clearance of at least 75 centimeters from any part of the line to any other object.

(3) The transmission line shall be connected to a balanced RF voltmeter or to a balun, which in turn is connected to the measuring instrument.

(4) Measurements of the signal level shall be made with the $\frac{3}{4}$ wavelength transmission line and with transmission lines of decreasing line length, in at least ten equal decrements (total of 11 measurements), to a length of $\frac{1}{4}$ wavelength.

(5) The signal level at the non-coaxial antenna input terminal of the transfer switch is taken to be the median of the values obtained in the measurements described in (4).

§15.747 Measurement of field strength: test configuration

(a) Field strength measurements must be performed on an open field test site. A description of the test facility must be filed in accordance with §15.38.



(Note: A Notice of Proposed Rule Making in FCC Docket No. 21371 was adopted by the Commission and released 9/1/77, which proposed to expand the requirements for test sites. A test site used after the effective date of the new rules, if and when adopted, will be subject to the new regulations.)

(b) The device (and accessories) shall be placed upon a rotatable nonconducting platform having the approximate dimensions of 75 centimeters by 100 centimeters, the top of which is 1 meter above the ground for equipment intended to be set on a table, or 45 centimeters above the ground for equipment intended to stand on the floor. The interface device should be connected to at least one of each type accessory provided by the manufacturer. Power and signal distribution interconnecting cable placement and accessory arrangement should simulate as near as possible the typical application and usage.

(c) The radiation from the TV interface device may be dependent upon the way accessories, remote controls, and the interconnecting cables are physically arranged on the table, and so several arrangements must be investigated to ensure that the maximum radiation is found.

(d) The distance between the measuring set antenna and the vertical axis of the turntable supporting the equipment under test (EUT) shall be 3 meters.

§15.748 Measurement of field strength: test equipment

(a) The level of radiated emissions shall be measured with a spectrum analyzer. The intermediate frequency (IF) bandwidth shall be at least 100 kHz for all measurements. Post detection filtering (i.e., video filtering) shall not be used. The signal level is considered to be the RMS level of an unmodulated sine wave signal which produces a response corresponding to the peak of the emission observed on the spectrum analyzer.

(b) If the level of field strength measured with a conventional spectrum analyzer exceeds the prescribed limits, because of the broadband characteristics of a particular emission from the EUT, an instrument conforming to the American National Standard Specifications for Electromagnetic Interference and Field Strength Instrumentation 10 kHz to 1 GHz C63.2 - 1977, may be used. The CISPR quasi-peak detector shall be used in this instance.

(c) Measurements shall be made using a tuned calibrated dipole or a linearly polarized broadband antenna as the pickup device. A mast should be employed to allow variation of the height above ground of the receiving antenna between 1 and 4 meters.

§15.749 Measurement of field strength: procedure

(a) The spectrum shall initially be searched from 30 MHz to at least 1000 MHz for emissions from the device under test. This search shall be made at a distance as close to the EUT as possible in order to increase the likelihood of detecting emissions.

(b) A measurement of field strength shall be made at 3 meters for each emission observed in the search discussed in (a) which is likely to yield significant radiation. To find the maximum signal strength, the following steps must be taken:

(1) The test platform shall be rotated a full 360 degrees.

(2) The height of the receiving antenna shall be varied between 1 meter and 4 meters above ground.

(3) Measurements shall be made for both horizontal and vertical polarization of the receiving antenna.

(c) For the purpose of converting measured levels to field strengths in microvolts per meter ($\mu\text{V}/\text{m}$) the usual antenna calibration factors, which apply to field strength measurements at distances far from a source, shall be employed.

(d) All modes of operation on the interface device shall be investigated to find the maximum field strength.



§15.750 Line conducted measurements

(a) Line conducted measurements shall be made with the equipment under test (EUT) connected to the power line through a line impedance stabilization network (LISN). The LISN provides a standard radio frequency (RF) impedance to the EUT and couples the conducted RF voltage to the measuring instrument. The LISN must be inserted in series with each current carrying conductor (including the neutral) in the line supplying power to the computing device, and in the lines of all the peripherals.

(b) Tests shall be performed using the procedure in IEEE Standard 213 - 1969. "Radio Interference: Methods of Measurement of Conducted Interference Output to the Power Line from FM and Television Broadcast Receivers in the range 300 kHz to 25 MHz with the exception that a 50 ohms-50 microhenry LISN shall be used in lieu of the LISN described in Standard 213." This procedure may be used for equipment other than broadcast receivers.

NOTE: Consideration of the use of 50 ohms-50 microhenry line stabilization network in line conducted measurements is being addressed in another Commission proceeding which will deal with the procedures to be followed in measuring the emanations from computing devices.

(c) The TV interface device and its accessories shall be set up in a typical operating configuration. The test configuration shall include at least one of each type accessory provided by the manufacturer for use with the interface device.

(d) Measurements shall be made with instrumentation conforming to the requirements of American National Standard Specification for Electromagnetic Interference and Field Strength Instrumentation 10 kHz to 1 GHz C63.2 - 1977. Other instruments may be used for certain restricted or specialized measurements when correlation of data has been taken to establish the methods of conversion of data to that achieved with C63.2 instrumentation.

(e) Measurements are to be made over the frequency range 450 kHz to 30 MHz. If the AC power cord of the EUT has a third wire, providing for connection to ground, measurements shall be made with the third wire both grounded and ungrounded to the LISN.

(f) In cases where accessories have their own provisions for connection to AC power, the accessories shall be connected to the LISN by connecting their AC power cords in parallel with that of the interface device. Where there are provisions for connection to ground, measurements shall be made with all units sharing a common ground to the LISN, and all units simultaneously ungrounded from the LISN.

§15.751 Report of measurements

(a) Measurements of output signal level shall be reported in microvolts (μ V) or in dB above 1 V (dB/ μ V). The impedance at the output terminals at which this measurement was made shall also be specified. If a balun was used, the loss of the balun must be reported and accounted for.

(b) Measurements of output terminal conducted spurious emissions shall be reported in microvolts (μ V) or in dB above 1 V (dB/ μ V). The frequency of the emission shall also be specified. If a balun was used, the loss of the balun must be reported and accounted for.

(c) The isolation is to be reported in microvolts (μ V) or in dB above 1 V (dB/ μ V) for each channel frequency provided. The impedance at the antenna input terminals at which this measurement was made shall be specified.

(d) The following information is to be included in reporting the results of field strength measurements:

(1) Measurements of radiated field strength shall be reported in microvolts per meter (μ V/m) measured at a distance of 3 meters. The data shall be presented in tabular form showing measured field strength versus frequency.



(2) The report shall state that the spectrum was searched from 30 MHz to 1000 MHz and that all emissions not reported were more than 20 dB below the prescribed limits.

(3) The instrumentation used and its settings shall be specified. The report shall indicate whether the results were obtained with the measuring instrument in the peak or quasi-peak mode.

(4) A discussion of how the equipment was arranged for the tests and what different configurations were investigated to maximize the emissions observed, must be included in the report.

(e) The following information is to be included in reporting the results of line conducted emissions measurements:

(1) The report shall indicate which LISN was used.

(2) Results shall be expressed in microvolts (μV) or in dB above 1 V (dB/ μV) developed across the 50 ohm LISN port terminated into a 50 ohm measurement instruments. The data shall be reported in tabular or graphical form showing voltage level versus frequency.

(3) The report shall state that the spectrum was searched from 450 kHz to 30 MHz and that all emissions not reported were more than 20 dB below the limits.
